

POPULAR Computing

WEEKLY

35p 2 December 1982 Vol 1 No 33

This Week

Dragon software

John Scriven reviews some of Dragon's latest cartridges and cassettes for the Dragon 32. See page 12.

ZX81 spiral

Simon Cross presents a machine code routine to print a character in a spiral from the edge of the screen to the centre on page 24.

Spectrum unfile

Week three in our series on building a unfile program for storing and managing data. See page 23.

Database

David Kelly talks to Tony Bastable about the making of Database — Thames TV's answer to The Computer Programme. See page 11.

Spectrum Suntrap

Can you protect your moon base from the Krugs? Find out in Mike Moscoff's new game for the 16K Spectrum. See page 8.

News Desk

Atari in new action

ATARI has continued its campaign against alleged infringements of its rights by taking legal action against Commodore in the US.

A preliminary injunction has been granted to Atari in a case involving possible infringement of patents held by the company. Atari filed suit in October, claiming that a joystick controller sold by Commodore in the US for use with the Vic20 computer competes unfairly and is a copy of an Atari design.

Atari won the injunction after a hearing before Federal judge Robert Owen, held in the southern district of New York. In so doing Atari has forced Commodore to stop manufacture and sale of the Vic20 add-on.

Commodore chairman, Irving Gould, commented "We sold a very small quantity of the joystick controller and discontinued its sales four months ago because it was not profitable."

No date has so far been fixed for a hearing of the full trial.



Clive Sinclair, ready to review Timex contracts.

Timex strike over — but doubts remain

PRODUCTION of the ZX81 and ZX Spectrum microcomputers has been restarted at the Timex plant in Dundee, following an eight day strike.

About 3,500 of the factory's 4,000 employees, including all assembly-line and maintenance workers, had been on strike since November 10. They agreed to return to work on November 18.

The strike was called after the suspension of five men at

the plant. With most of Sinclair's ZX81 and Spectrum micros being assembled in Dundee, the stoppage had serious implications for the company.

"The strike happened at a bad time for us," said a Sinclair spokesman. "We were confident that, in the short term, we had sufficient supplies, but it was very frustrating, given that we had only just been able to clear our

Continued on page II

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Continued on page 28

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Space Invaders	23.95	29.95		
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Editor

Brendon Gore

News Editor

David Kelly [01-930 3271]

Sub-editor

Ninette Sharp

Editorial Secretary

Theresa Lacy

Advertisement Manager

David Lake [01-839 2846]

Advertisement Executive

Alastair Macintosh [01-930 3840]

Managing Editor

Duncan Scot

Publishing Director

Jenny Ireland

Popular Computing Weekly,
Hobhouse Court, 19 Whitcomb Street,
London WC2
Telephone: 01-839 6835

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Articles which are submitted for publication should not be more than 3,000 words long. The articles, and any accompanying programs, should be original. Is it breaking the law of copyright to copy programs out of other magazines and submit them here — so please do not be tempted.

All submissions should be typed and a double space should be left between each line. Please leave wide margins.

Programs should, whenever possible, be computer printed.

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Accuracy

Popular Computing Weekly cannot accept any responsibility for any errors in programs we publish, although we will always try our best to make sure programs work.

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Editorial

Micros and the disabled are, at first sight, an odd juxtaposition of man and machine. Why, after all, should someone who is mentally or physically handicapped, want to play Space invaders?

Yet the link between micros and the disabled is not really so surprising. Microcomputers can enable the handicapped to forget about their disabilities for a while. In some cases, micros can even be used to help the disabled to overcome some of their limitations.

More importantly, perhaps, micros treat all their users the same. The colour of your skin, the number of your arms and legs, even your ability to speak, matters not to the micro.

Many of the problems suffered by the disabled are worsened by the attitudes of those around them. All too often, handicapped people are regarded as being mentally sub-normal simply because they are physically handicapped.

Most people, for example, on meeting a disabled person in a wheelchair will talk to whoever is pushing the chair, rather than to the person who is sitting in it.

It is a sad reflection on the world we live in that micros can seem more humane to the disabled than their human counterparts.

Next Thursday

Have you got what it takes to be an astronaut? Could you pilot a spacecraft through the solar wind? Find out in *Lunar Lander* — the definitive game for 16K Spectrum and 1K ZX81.

Also next week, a tape index program for the Vic20 by John Ingham and a survey of Atari software.

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Timex strike comes to an end

Continued from page 1

Stocks order back-log."

Stocks of the ZX81 machines are probably quite substantial, since for some time production has exceeded UK demand, and a large proportion are exported.

Since the strike began, the only Spectrum microcomputers being manufactured have been those assembled by Thorn/EMI subsidiary, DataTech, at Feltham. Thorn/EMI began assembly in September as a second source to reduce the then lengthening delivery times on Spectrum orders.

Sinclair Research is currently investigating alternative manufacturing arrangements.

Clive Sinclair had commented that if the strike was prolonged then the Timex contracts would have to be reviewed.

A Sinclair spokesman said "We are currently involved in serious discussions with other manufacturers. It would obviously be a very major move to switch our production from Timex, but we also have to be prepared to act if necessary. We do regard the situation, resulting from circumstances completely beyond our control, as very serious."

Timex has two plants in Dundee. If Sinclair were to take their manufacturing contracts elsewhere there is concern that Timex would be forced to close one of its sites, leading to possible redundancies.

Computer show

THE Which Computer? show is being held at the National Exhibition Centre, Birmingham, on January 18-21. Entrance costs £3 and is limited to over 18s only. For more information, telephone 01-747 3131.

Prestel service to be expanded

BRITISH Telecom is to extend the areas of the country where its Prestel service can be received.

Work, to be completed by the start of 1984, will mean that 92 percent of telephone users will be within a local call of the Prestel scheme. At present only 62 percent can access the system at low cost.

Lynx leaps into High Street

THE much awaited Lynx microcomputer is to go on sale in high street stores in the second week of December.

Computers' micro will be stocked by Dixons, Laskys and Spectrum Computer Centres, following agreements reached last week. A large proportion of Dixons shops, about half Laskys outlets and all the 60 Spectrum Centres will be selling the Lynx.

Michael Stern, Chairman of the Spectrum Group, commented "Our technical people



think it is a very fine machine at the right price. It is British made and it has got everything going for it."

The first batch of 3,000 machines is now being assembled and will be ready for testing by the end of November. Production is planned to continue at 3,500 units per month, but will be increased if demand for the micro is sufficient. The Lynx will sell for £225 including VAT.

Stacking the deck for Vic

STACK Computer Services has produced a 40/80 column card for the Vic20 microcomputer.

It enables programs to be written and executed in either a 40 or 80 column format, while retaining the full Vic character set. The card is intended mainly for word processing applications and displays in black-and-white. Full editing, as on the standard Vic display, is possible with both upper and lower case characters, graphics symbols and reversed field.

Stack's Roger Parkinson explained: "The card contains a ROM sitting in the auto-start position so that, when you switch on your Vic, it overwrites the 22-column Vic screen and generates its own complete memory-mapped screen."

Because of the way the card has been designed the Stack 40/80 screen and the standard Vic screen are held in different areas of Ram. It is possible to program data to appear on either screen, although a second TV is required to view the 22-column Vic display. On



Stack's 40/80 column card.

the Stack screen it is possible, using simple key combinations, to switch between the 40 and 80 column display modes.

The Stack 40/80 column card, which can be used with the unexpanded Vic and with most expansion options, is priced at £115 including VAT.

The add-on has been accorded official Commodore approval and will initially only be available to VicSoft members. It will be available for normal Commodore retailers from December 31.

Thorn/Emi forms computer division

THORN/EMI has combined its information technology interests to form a single division to concentrate on computer services. Colin Southgate has been appointed as chief executive of the new IT division.

The company is expanding rapidly into the computer field, following its acquisition

of Software Sciences and DataSolve from BOC earlier this year and the success of its DataTech subsidiary.

Within the last 10 weeks it has taken over some manufacturing and assembly work on the Sinclair ZX Spectrum and has also produced software for the Atari and Vic20 machines.

New Acorn micro held back until '83

ACORN'S new Electron microcomputer will not now go on sale until next year.

"The company has, if you like, grown up" commented an Acorn spokesman. "The machine will not be offered for sale until we have built up substantial stocks. The Electron is ready apart from the ULAs and, as we have discovered in the past, the time that will take is anybody's guess."

Planned to sell for around £150, the new machine will feature a calculator type keyboard (similar to that on the Sinclair Spectrum), 32K Ram and graphics capabilities similar to Acorn's BBC Model B micro.

The Electron was originally scheduled for launch before Christmas.

And then there were three

ORIC Products has announced that a third version of the Oric I microcomputer is to be produced.

A 32K model will now join the planned 16K and 48K versions. The machines, in order of memory size, will cost £99.95, £139.95 and £169.



Possum's help for handicapped

ONE of three versions of the Spectrum microcomputer designed to help the physically disabled.

The machines have been developed, in collaboration with Sinclair Research, by Possum Controls, specialists in aids for the disabled. The Expanded Keyboard model (above), has been produced for people with gross movement or tremors.

Other versions use a light to scan a replica of the Spectrum keyboard to select keys.

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LETTERS

Moody Blues Instrumental

Clive Sinclair has really started to rub salt into the wounds with his new "Musical Answering Machine". Last week, I telephoned twice, the first time I was serenaded with "It's Impossible" and the second time it was "You Are The Sunshine Of My Life!"

All readers will now want to think up their own ideas for songs which they feel may sum up the true Sinclair. How about — "I Can't Get No Satisfaction"? Remember also "Yesterday Man?"

G C Smith
94 South End Road
Rainham
Essex

Pie in the sky when you die

I have just read your editorial (November 4) and I couldn't

agree with you more! I received my Spectrum on October 30 at 1.50 pm. On October 31 at 9.00 pm I was in the middle of programming it when the screen went blank and my Spectrum joined its many brothers in the Great Computer Room in the sky.

So, after 17 weeks wait I had my Spectrum alive and working for less than two days. I know that things aren't meant to last these days, but incorporating a self-destruct mechanism that activates after a few hours is going a bit far, don't you think? Or has "Uncle Clive" been watching too many "Mission Impossible" videos.

Seriously though, as a programmer by trade I know computers have teething problems but this is turning into a farce and a very unfunny and painful one at that. It will take more than a free cassette and a voucher for ZX printer paper (as if I would ever trust Sine-

lair with my money again) to compensate me for the feeling of utter disappointment and then anger when my Spectrum died. Up until then I was very pleased with it and thought it almost worth the 17 weeks wait.

I suppose I will have to wait weeks for a replacement now. Still, it will make a nice new-year present for me.

B J Lowry
63 Cavendish Crescent
Hornchurch
Essex

With a crack of the whip

While there is still time, I claim to have cracked the Sinclair micro-drive problem. One track spiral in like gramophone record.

L Hewson
35 Haroldssea Drive
Horley
Surrey RH6 9DT

Angling into correct formulae

In your issue dated October 28, Andrew Esmond's formulae are incorrect. They only work for a rotation of 45° as $\sin 45^\circ = \cos 45^\circ$. Any other angle put through his formula gives some very obscure graphics. The correct formulae are:

$$x = x \cos \theta - y \sin \theta$$

$$y = x \sin \theta + y \cos \theta$$

Here is a program for the Spectrum which allows a cube to be rotated in three directions using Inkeys:

0 — around

```

1  PAPER 8, INK 6: BORDER 2
2  PODE 23059,50
3  LET S=30
4  LET X=100
5  LET Y=100
6  LET MX=255 LET MY=176
7  LET CX=255 LET CY=192
8  LET D1=181 DIM V(10) DIM Z(10)
9  LET R(10) DIM B(10)
10  LET F(10) LET X1(10) LET Y1(10)
11  LET X2(10) LET Y2(10) LET Z1(10)
12  LET Z2(10)
13  FOR R=1 TO 4
14  LET V(1)=X LET Y1(1)=Y
15  LET V(2)=X LET Y1(2)=Y+1
16  LET V(3)=X+1 LET Y1(3)=Y
17  LET V(4)=X+1 LET Y1(4)=Y+1
18  LET V(5)=X+2 LET Y1(5)=Y
19  LET V(6)=X+2 LET Y1(6)=Y+1
20  LET V(7)=X+1 LET Y1(7)=Y+2
21  LET V(8)=X LET Y1(8)=Y+2
22  NEXT R
23  GO SUB 1010
24  IF INKEY$="" THEN GO TO 310
25  IF INKEY$="A" THEN GO SUB 1
26  IF INKEY$="D" THEN GO SUB 2
27  IF INKEY$="W" THEN GO SUB 3
28  IF INKEY$="S" THEN GO SUB 4
29  GO SUB 1010
30  GO TO 310
310  FOR F=1 TO 8
320  LET X=X1(F)*COS R+(Y1(F)*SIN R)
330  LET Y=Y1(F)*SIN R-(Y1(F)*COS R)
340  IF X>MX OR X<B1 OR Y>MY OR Y<B2 THEN GO TO 310
350  LET X1(F)=X LET Y1(F)=Y
360  NEXT F
370  GO SUB 2000
380  RETURN
390  FOR F=1 TO 8
400  LET X=y1(F)*COS R-z1(F)*SIN
410  LET Y=y1(F)*SIN R+z1(F)*COS
420  LET Z=z1(F)
430  IF X>MX OR X<B1 OR Y>MY OR Y<B2 THEN GO TO 310
440  LET X1(F)=X LET Y1(F)=Y
450  NEXT F
460  GO SUB 2000
470  RETURN
480  FOR F=1 TO 8
490  LET X=x1(F)*COS R+y1(F)*SIN
500  LET Y=x1(F)*SIN R-y1(F)*COS
510  LET Z=z1(F)
520  IF X>MX OR X<B1 OR Y>MY OR Y<B2 THEN GO TO 310
530  LET X1(F)=X LET Y1(F)=Y
540  NEXT F
550  GO SUB 2000
560  RETURN
570  FOR F=1 TO 8
580  LET X=x1(F)*COS R+y1(F)*SIN
590  LET Y=x1(F)*SIN R-y1(F)*COS
600  LET Z=z1(F)
610  IF X>MX OR X<B1 OR Y>MY OR Y<B2 THEN GO TO 310
620  LET X1(F)=X LET Y1(F)=Y
630  NEXT F
640  GO SUB 2000
650  RETURN
660  FOR F=1 TO 8
670  LET X=x1(F)*COS R-z1(F)*SIN
680  LET Y=x1(F)*SIN R+z1(F)*COS
690  LET Z=z1(F)
700  IF X>MX OR X<B1 OR Y>MY OR Y<B2 THEN GO TO 310
710  LET X1(F)=X LET Y1(F)=Y
720  NEXT F
730  GO SUB 2000
740  RETURN
750  FOR F=1 TO 8
760  LET X=x1(F)*COS R+y1(F)*SIN
770  LET Y=x1(F)*SIN R-y1(F)*COS
780  LET Z=z1(F)
790  IF X>MX OR X<B1 OR Y>MY OR Y<B2 THEN GO TO 310
800  LET X1(F)=X LET Y1(F)=Y
810  NEXT F
820  GO SUB 2000
830  RETURN
840  FOR F=1 TO 8
850  LET X=x1(F)*COS R-z1(F)*SIN
860  LET Y=x1(F)*SIN R+z1(F)*COS
870  LET Z=z1(F)
880  IF X>MX OR X<B1 OR Y>MY OR Y<B2 THEN GO TO 310
890  LET X1(F)=X LET Y1(F)=Y
900  NEXT F
910  GO SUB 2000
920  RETURN
930  FOR F=1 TO 8
940  LET X=x1(F)*COS R+y1(F)*SIN
950  LET Y=x1(F)*SIN R-y1(F)*COS
960  LET Z=z1(F)
970  IF X>MX OR X<B1 OR Y>MY OR Y<B2 THEN GO TO 310
980  LET X1(F)=X LET Y1(F)=Y
990  NEXT F
1000  GO SUB 2000
1010  RETURN
1020  FOR F=1 TO 8
1030  LET X=x1(F)*COS R-z1(F)*SIN
1040  LET Y=x1(F)*SIN R+z1(F)*COS
1050  LET Z=z1(F)
1060  IF X>MX OR X<B1 OR Y>MY OR Y<B2 THEN GO TO 310
1070  LET X1(F)=X LET Y1(F)=Y
1080  NEXT F
1090  GO SUB 2000
1100  RETURN
1110  FOR F=1 TO 8
1120  LET X=x1(F)*COS R+y1(F)*SIN
1130  LET Y=x1(F)*SIN R-y1(F)*COS
1140  LET Z=z1(F)
1150  IF X>MX OR X<B1 OR Y>MY OR Y<B2 THEN GO TO 310
1160  LET X1(F)=X LET Y1(F)=Y
1170  NEXT F
1180  GO SUB 2000
1190  RETURN
1200  FOR F=1 TO 8
1210  LET X=x1(F)*COS R-z1(F)*SIN
1220  LET Y=x1(F)*SIN R+z1(F)*COS
1230  LET Z=z1(F)
1240  IF X>MX OR X<B1 OR Y>MY OR Y<B2 THEN GO TO 310
1250  LET X1(F)=X LET Y1(F)=Y
1260  NEXT F
1270  GO SUB 2000
1280  RETURN
1290  FOR F=1 TO 8
1300  LET X=x1(F)*COS R+y1(F)*SIN
1310  LET Y=x1(F)*SIN R-y1(F)*COS
1320  LET Z=z1(F)
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1340  LET X1(F)=X LET Y1(F)=Y
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1360  GO SUB 2000
1370  RETURN
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1480  LET X=x1(F)*COS R+y1(F)*SIN
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1520  LET X1(F)=X LET Y1(F)=Y
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1570  LET X=x1(F)*COS R-z1(F)*SIN
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1930  LET X=x1(F)*COS R-z1(F)*SIN
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1950  LET Z=z1(F)
1960  IF X>MX OR X<B1 OR Y>MY OR Y<B2 THEN GO TO 310
1970  LET X1(F)=X LET Y1(F)=Y
1980  NEXT F
1990  GO SUB 2000
2000  RETURN
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2020  LET X=x1(F)*COS R+y1(F)*SIN
2030  LET Y=x1(F)*SIN R-y1(F)*COS
2040  LET Z=z1(F)
2050  IF X>MX OR X<B1 OR Y>MY OR Y<B2 THEN GO TO 310
2060  LET X1(F)=X LET Y1(F)=Y
2070  NEXT F
2080  GO SUB 2000
2090  RETURN
2100  FOR F=1 TO 8
2110  LET X=x1(F)*COS R-z1(F)*SIN
2120  LET Y=x1(F)*SIN R+z1(F)*COS
2130  LET Z=z1(F)
2140  IF X>MX OR X<B1 OR Y>MY OR Y<B2 THEN GO TO 310
2150  LET X1(F)=X LET Y1(F)=Y
2160  NEXT F
2170  GO SUB 2000
2180  RETURN
2190  FOR F=1 TO 8
2200  LET X=x1(F)*COS R+y1(F)*SIN
2210  LET Y=x1(F)*SIN R-y1(F)*COS
2220  LET Z=z1(F)
2230  IF X>MX OR X<B1 OR Y>MY OR Y<B2 THEN GO TO 310
2240  LET X1(F)=X LET Y1(F)=Y
2250  NEXT F
2260  GO SUB 2000
2270  RETURN
2280  FOR F=1 TO 8
2290  LET X=x1(F)*COS R-z1(F)*SIN
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2990  RETURN
3000  FOR F=1 TO 8
3010  LET X=x1(F)*COS R-z1(F)*SIN
3020  LET Y=x1(F)*SIN R+z1(F)*COS
3030  LET Z=z1(F)
3040  IF X>MX OR X<B1 OR Y>MY OR Y<B2 THEN GO TO 310
3050  LET X1(F)=X LET Y1(F)=Y
3060  NEXT F
3070  GO SUB 2000
3080  RETURN
3090  FOR F=1 TO 8
3100  LET X=x1(F)*COS R+y1(F)*SIN
3110  LET Y=x1(F)*SIN R-y1(F)*COS
3120  LET Z=z1(F)
3130  IF X>MX OR X<B1 OR Y>MY OR Y<B2 THEN GO TO 310
3140  LET X1(F)=X LET Y1(F)=Y
3150  NEXT F
3160  GO SUB 2000
3170  RETURN
3180  FOR F=1 TO 8
3190  LET X=x1(F)*COS R-z1(F)*SIN
3200  LET Y=x1(F)*SIN R+z1(F)*COS
3210  LET Z=z1(F)
3220  IF X>MX OR X<B1 OR Y>MY OR Y<B2 THEN GO TO 310
3230  LET X1(F)=X LET Y1(F)=Y
3240  NEXT F
3250  GO SUB 2000
3260  RETURN
3270  FOR F=1 TO 8
3280  LET X=x1(F)*COS R+y1(F)*SIN
3290  LET Y=x1(F)*SIN R-y1(F)*COS
3300  LET Z=z1(F)
3310  IF X>MX OR X<B1 OR Y>MY OR Y<B2 THEN GO TO 310
3320  LET X1(F)=X LET Y1(F)=Y
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3360  FOR F=1 TO 8
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3990  FOR F=1 TO 8
4000  LET X=x1(F)*COS R+y1(F)*SIN
4010  LET Y=x1(F)*SIN R-y1(F)*COS
4020  LET Z=z1(F)
4030  IF X>MX OR X<B1 OR Y>MY OR Y<B2 THEN GO TO 310
4040  LET X1(F)=X LET Y1(F)=Y
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4060  GO SUB 2000
4070  RETURN
4080  FOR F=1 TO 8
4090  LET X=x1(F)*COS R-z1(F)*SIN
4100  LET Y=x1(F)*SIN R+z1(F)*COS
4110  LET Z=z1(F)
4120  IF X>MX OR X<B1 OR Y>MY OR Y<B2 THEN GO TO 310
4130  LET X1(F)=X LET Y1(F)=Y
4140  NEXT F
4150  GO SUB 2000
4160  RETURN
4170  FOR F=1 TO 8
4180  LET X=x1(F)*COS R+y1(F)*SIN
4190  LET Y=x1(F)*SIN R-y1(F)*COS
4200  LET Z=z1(F)
4210  IF X>MX OR X<B1 OR Y>MY OR Y<B2 THEN GO TO 310
4220  LET X1(F)=X LET Y1(F)=Y
4230  NEXT F
4240  GO SUB 2000
4250  RETURN
4260  FOR F=1 TO 8
4270  LET X=x1(F)*COS R-z1(F)*SIN
4280  LET Y=x1(F)*SIN R+z1(F)*COS
4290  LET Z=z1(F)
4300  IF X>MX OR X<B1 OR Y>MY OR Y<B2 THEN GO TO 310
4310  LET X1(F)=X LET Y1(F)=Y
4320  NEXT F
4330  GO SUB 2000
4340  RETURN
4350  FOR F=1 TO 8
4360  LET X=x1(F)*COS R+y1(F)*SIN
4370  LET Y=x1(F)*SIN R-y1(F)*COS
4380  LET Z=z1(F)
4390  IF X>MX OR X<B1 OR Y>MY OR Y<B2 THEN GO TO 310
4400  LET X1(F)=X LET Y1(F)=Y
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4420  GO SUB 2000
4430  RETURN
4440  FOR F=1 TO 8
4450  LET X=x1(F)*COS R-z1(F)*SIN
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4470  LET Z=z1(F)
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4490  LET X1(F)=X LET Y1(F)=Y
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4630  LET X=x1(F)*COS R-z1(F)*SIN
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4650  LET Z=z1(F)
4660  IF X>MX OR X<B1 OR Y>MY OR Y<B2 THEN GO TO 310
4670  LET X1(F)=X LET Y1(F)=Y
4680  NEXT F
4690  GO SUB 2000
4700  RETURN
4710  FOR F=1 TO 8
4720  LET X=x1(F)*COS R+y1(F)*SIN
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4980  FOR F=1 TO 8
4990  LET X=x1(F)*COS R-z1(F)*SIN
5000  LET Y=x1(F)*SIN R+z1(F)*COS
5010  LET Z=z1(F)
5020  IF X>MX OR X<B1 OR Y>MY OR Y<B2 THEN GO TO 310
5030  LET X1(F)=X LET Y1(F)=Y
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5070  FOR F=1 TO 8
5080  LET X=x1(F)*COS R+y1(F)*SIN
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5100  LET Z=z1(F)
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5120  LET X1(F)=X LET Y1(F)=Y
5130  NEXT F
5140  GO SUB 2000
5150  RETURN
5160  FOR F=1 TO 8
5170  LET X=x1(F)*COS R-z1(F)*SIN
5180  LET Y=x1(F)*SIN R+z1(F)*COS
5190  LET Z=z1(F)
5200  IF X>MX OR X<B1 OR Y>MY OR Y<B2 THEN GO TO 310
5210  LET X1(F)=X LET Y1(F)=Y
5220  NEXT F
5230  GO SUB 2000
5240  RETURN
5250  FOR F=1 TO 8
5260  LET X=x1(F)*COS R+y1(F)*SIN
5270  LET Y=x1(F)*SIN R-y1(F)*COS
5280  LET Z=z1(F)
5290  IF X>MX OR X<B1 OR Y>MY OR Y<B2 THEN GO TO 310
5300  LET X1(F)=X LET Y1(F)=Y
5310  NEXT F
5320  GO SUB 2000
5330  RETURN
5340  FOR F=1 TO 8
5350  LET X=x1(F)*COS R-z1(F)*SIN
5360  LET Y=x1(F)*SIN R+z1(F)*COS
5370  LET Z=z1(F)
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5390  LET X1(F)=X LET Y1(F)=Y
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5700  FOR F=1 TO 8
5710  LET X=x1(F)*COS R-z1(F)*SIN
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5730  LET Z=z1(F)
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6080  LET Y=x1(F)*SIN R+z1(F)*COS
6090  LET Z=z1(F)
6100  IF X>MX OR X<B1 OR Y>MY OR Y<B2 THEN GO TO 310
6110  LET X1(F)=X LET Y1(F)=Y
6120  NEXT F
6130  GO SUB 2000
6140  RETURN
6150  FOR F=1 TO 8
6160  LET X=x1(F)*COS R+y1(F)*SIN
6170  LET Y=x1(F)*SIN R-y1(F)*COS
6180  LET Z=z1(F)
6190  IF X>MX OR X<B1 OR Y>MY OR Y<B2 THEN GO TO 310
6200  LET X1(F)=X LET Y1(F)=Y
6210  NEXT F
6220  GO SUB 2000
6230  RETURN
6240  FOR F=1 TO 8
6250  LET X=x1(F)*COS R-z1(F)*SIN
6260  LET Y=x1(F)*SIN R+z1(F)*COS
6270  LET Z=z1(F)
6280  IF X>MX OR X<B1 OR Y>MY OR Y<B2 THEN GO TO 310
6290  LET X1(F)=X LET Y1(F)=Y
6300  NEXT F
6310  GO SUB 2000
6320  RETURN
6330  FOR F=1 TO 8
6340  LET X=x1(F)*COS R+y1(F)*SIN
6350  LET Y=x1(F)*SIN R-y1(F)*COS
6360  LET Z=z1(F)
6370  IF X>MX OR X<B1 OR Y>MY OR Y<B2 THEN GO TO 310
6380  LET X1(F)=X LET Y1(F)=Y
6390  NEXT F
6400  GO SUB 2000
6410  RETURN
6420  FOR F=1 TO 8
6430  LET X=x1(F)*COS R-z1(F)*SIN
6440  LET Y=x1(F)*SIN R+z1(F)*COS
6450  LET Z=z1(F)
6460  IF X>MX OR X<B1 OR Y>MY OR Y<B2 THEN GO TO 310
6470  LET X1(F)=X LET Y1(F)=Y
6480  NEXT F
6490  GO SUB 2000
6500  RETURN
6510  FOR F=1 TO 8
6520  LET X=x1(F)*COS R+y1(F)*SIN
6530  LET Y=x1(F)*SIN R-y1(F)*COS
6540  LET Z=z1(F)
6550  IF X>MX OR X<B1 OR Y>MY OR Y<B2 THEN GO TO 310
6560  LET X1(F)=X LET Y1(F)=Y
6570  NEXT F
6580  GO SUB 2000
6590  RETURN
6600  FOR F=1 TO 8
6610  LET X=x1(F)*COS R-z1(F)*SIN
6620  LET Y=x1(F)*SIN R+z1(F)*COS
6630  LET Z=z1(F)
6640  IF X>MX OR X<B1 OR Y>MY OR Y<B2 THEN GO TO 310
6650  LET X1(F)=X LET Y1(F)=Y
6660  NEXT F
6670  GO SUB 2000
6680  RETURN
6690  FOR F=1 TO 8
6700  LET X=x1(F)*COS R+y1(F)*SIN
6710  LET Y=x1(F)*SIN R-y1(F)*COS
6720  LET Z=z1(F)
6730  IF X>MX OR X<B1 OR Y>MY OR Y<B2 THEN GO TO 310
6740  LET X1(F)=X LET Y1(F)=Y
6750  NEXT F
6760  GO SUB 2000
6770  RETURN
6780  FOR F=1 TO 8
6790  LET X=x1(F)*COS R-z1(F)*SIN
6800  LET Y=x
```

Suntrap

A new game for 16K Spectrum
by Mike Moscoff

YOU control a laser station, protecting a moon base from the dreaded Krugs. The Krugs, traditionally evil, have vowed to wipe out all Yoomans.

When run, this program displays brief instructions. Reply 0 or 1 to the query about difficulty level required. Wait one minute while variables are assigned and the screen is drawn.

The game starts with a bleep. Use keys 5, 6, 7 and 8 to move your sights (left, down, up and right). Use keys 0 or 1 to fire. The game ends when all your power is gone.

How it works:

900-990	Displays the instructions.
700-790	Sets up all variables, and defines special characters.
600-690	Draws the screen.
76	Prints the score.
100-140	Moves your sights.
150-190	Fires your laser.
200-220	Explodes alien #1.
300-340	Moves the alien.
343	Fires the alien laser.
350-390	Sets up a new alien.
600-690	End of game routine.

To test the program, first enter lines 30, 35, 45-220, 700-790, 870-890, and Run. This should define all variables, print score, move your sights (keys 5-8), and fire the laser (keys 0,1). Then add lines 40, 300-385. The alien should move randomly from left to right and hits should be registered. Finally, add lines 20, 600-690, 800-850, 900-985.

Enhancements

The speed can be improved slightly by:

- (1) Deleting all Rem statements.
- (2) Deleting Beeps in lines 130, 160, 175, 330 and 343.
- (3) Deleting all the fancy visuals.
- (4) Using machine code.

The end routine (lines 600-690) could be improved by adding:

```
626 LET r$="" : LET sc=( "by harder" AND
sc<200) + ("we'd done" AND sc>198
AND sc<400) + ("excellent" AND
sc>399)
630 PRINT AT 12,12 : IS
```

Also, a 'High score' could be added:
LET N=0
IF sc > N THEN LET hi = sc : PRINT AT
14,12 : "HIGH SCORE! : AT 15,16 : hi

Variables:

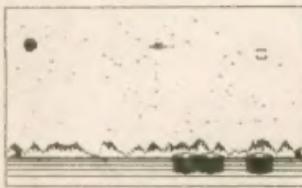
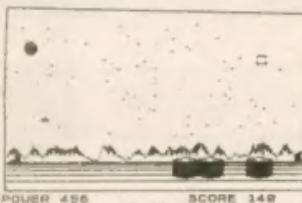
ux, uy
uzz, uyo
tx, ty
tzo, tyo
fc
po
sc
iz
ino
hi
itp
df
ht
lxz, lyz
ts
us
rs

Sights x, y position.
Sights old position.
Aliens x, y position.
Aliens old position change.
Power.
Score.
No of laser bolts fired.
No of aliens.
No of kills.
Difficulty setting.
Hit flag.
Sights plot position.
Old alien character(s).
Old alien character(s), and key(s) response.
Your replies.

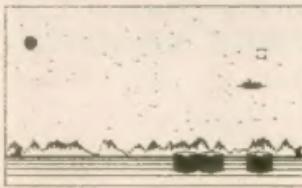
Graphics characters:

A	Sights
B	Alien-1.
CD	Alien-2.
CED	Alien-3.
F	Explosion-1.
G	Explosion-2.





POWER 456 SCORE 140
LAZER 15 NO 11 KILLS 2



FOUNDER 438
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Television micro vision—tomorrow's world today

David Kelly visits Thames TV to watch an episode of *Database* being recorded.

"Stand by studio . . . we're going for a take on items 1 to 4 . . . can we have a clock? . . . stand by VT . . . 30 seconds . . . roll VT . . . 10, 9, 8, 7 . . ."

In the studio control room six pairs of eyes are fixed on the array of monitors. At three, the Academy leader is replaced by blank screens. At zero two of them brighten to show the Thames Television signature and at minus five another episode of the six-part computer programme *Database* begins.

Each Monday finds the production team in Studio 3 in Teddington where the video-tape links are recorded which join the show together. *Database* is a magazine-type programme, presented by Tony Bastable. Dealing very much in current affairs for computer enthusiasts, the individual items in each programme are put together at the last minute, at the same time as the week's computer news section is recorded. The first part to record is the 'testers'. These form a short résumé of each programme's content — shown before the main title — to grab the viewer's attention.



Tony Bastable (right) — keeping his feet on the ground

Database goes out at 11.30 pm on Tuesday evenings on Thames (it is not networked nationally as yet) and at that time of night you really have to catch your audience.

Designed to grab you in this episode were: "Just how intelligent is a computer? Could it replace the doctor with faster and more accurate diagnoses? Do you need to master a computer language to use the huge amount of information it can store? We report on the clergyman who uses Space Invader-type games to teach the bible. And if you use the mix facility on your Teletext-equipped television you'll be able to superimpose new pages of information available on Thames' new Oracle service which starts today."

The idea for the programme came from Mike Feldman — Database Associate Producer. "I first had the idea for a sort of Computer Club two years ago. Microcomputers were a growth area and I thought about a series aimed at the home programmer. That idea never happened, but instead we made a short series for children's television called 'Living in the Future.' I had an Apple at home which I bought for fun and my kids loved it. I based the series on their reactions.

"About this time Thames perceived the need to be active in information technology and proposed the *Database* series.

"We were given six half-hour slots," he says. "A great deal of research went to find out what sort of programme was needed — and we came up with two possible formats. We could have a series dealing generally with computers and with applications and problems arising from them. Or we could have a straightforward programme about how to learn Basic."

"We opted for the former — and chose a magazine format to keep the show lively.

"That is where I came in," says presen-

ter Tony Bastable. "My expertise is in the arrangement of magazine programmes.

"Each episode has a central theme — the first was on cable tv the one we are doing now is on artificial intelligence. Apart from that the whole series has a central philosophy, that it is not for us to come in terms with the computer, but for the computer to come in terms with us! We aim to demystify the computer, and ask some important questions like: Do we need them? What will they do? And do we need what they do?"

"I started off — coming from Thames' microminiature programme *Wheelbase* — with a major advantage: total ignorance," grins Tony. "I ask the sort of obvious questions that the experts assume people know.



Micros in focus

When I first started work on the series I thought 'Why not explain how it works — like you can a carburettor on a car? How does the signal get from A here to the microchip over there?' It was then I discovered it wasn't that easy. Not only could very few people using microcomputers begin to say how they worked — but they didn't care! You put A in here and B comes out there, what goes on in the middle is a complete mystery, but it doesn't matter.

"The important thing, I think, is never to let your feet leave the ground. To never get carried away with the wonders of science and lose sight of the everyday practicality of things. When we went to that dreadful computer controlled house in Milton Keynes it had a tv screen on which you could leave messages. I wrote on it 'Gone to lunch' and pointed out that you could just as well use a pen and paper. If something isn't very good we have said so, but everybody gets a fair crack of the whip.

"One of the things we decided when we started was that we would only consider today's world. *Database* is a current affairs technology programme.

"It has been a long hard slog for us to get *Database* put on," says Mike Feldman. "Both our series and the BBC's Computer Programme have suffered from scheduling at strange times — the difficulty is to prove that such a programme can attract an audience.

"I hope we have managed to produce a show that is enjoyable to watch. It is difficult to judge audience reaction but the reviews have been favourable and our ratings are going up. We have established that information technology can be both interesting and good television.

"The most important thing to have come out of our series has been the next one. We have been given the go-ahead to do 12 programmes next year.

"What we want," says Mike, "is one programme per month, networked nationally, at 7.00 peak viewing time — but we will have to wait and see!"

Dragon quest

John Scriven breathes fire into some of Dragon's latest software.

Since its appearance in the summer, sales of the Dragon have soared. The reasons why are fairly clear — it offers 32K Ram, colour, sound, the latest Microsoft Basic and most importantly, it is available at hundreds of retail outlets up and down the country. Along with the machine, Dragon Data has released a wide range of software that is available from the same retailers.

It was not until many months after the ZX81 appeared that Sinclair produced his own software. "Official Spectrum programs are only just coming on to the market. Acorn also waited for some time before producing BBC software. In this respect, Dragon Data has learned from the experience of previous manufacturers and has attempted to get an early foothold in an important market.

The programs can be divided into two groups, cartridges and cassettes. The cartridges slot neatly into the side of the Dragon and are running within seconds, each time, every time, so are ideal for instant games. They do, however, appear to be rather expensive at £19-£25, although this is a feature shared with Vic and Alan cartridges.

Most of the cartridges contain two single-rail Eproms in a well-constructed box that small fingers will not be able to pry apart and do not wobble when inserted like certain infamous Ram-packs. In defence of the price, it must be admitted that were you to design your own PCB, burn Eproms, etc., then the hardware alone would probably be in excess of £10. You get what you pay for, and in this case it is reliability, ease of loading, and no fiddly leads and cassette levels.

The cartridges are all arcade-type games and several need joysticks to play. Meteoroids is a version of Asteroids, with one or two advantages over similar games. Firstly, the skill level is selectable (0-15) as is the number of joysticks employed. Secondly, the movement of your spacecraft tends more towards Newton's laws of motion than most variants, which makes the game more difficult — it is easy at higher skill levels to be sent flying off the screen at an uncontrollable speed.

The object of the game is to destroy as many meteoroids as possible before being zapped yourself by deadly flying saucers. Individual and best scores are shown in a league table. My one small criticism is that the display is in black and white (or buff as Dragon Data calls it). It's a pity the game could not have been written in a different

mode utilising a wider colour range. At least it does not use the rather emetic green that is the default colour when you switch on.

Cosmic Invaders is the standard *Invaders* arcade game that I will not bore you with by describing. (Can there still be people left in the country who don't know the game?) I presume Dragon Data felt their patrons would feel left out if they did not include it in their catalogue, but this is hardly a sparkling version and is not too difficult to master.

Starship Chameleon can be played by one or two players and involves destroying enemy rockets by colliding your own craft with them. The interesting difference is that some craft are made of matter and some of anti-matter. If you do not select the correct status of your ship (using the



"fire" button or the joystick) you will explode. Matter/anti-matter states are shown by blue/yellow colour changes.

Red missiles that are "smart", in home in on you, add to the challenge of the game. Skill levels from 1 to 9 may be selected and scores are shown on screen. My criticism of this game is that the background colour is green and the scores do not show up as well as they might.

There are two cartridges of the maze-pursuit variety, although they are different

enough from the original to avoid threats of legal action flying to South Wales from America.

Cave Hunters presents you with a cave maze, always the same, with four bars of gold at the base. The bold cave hunter has to collect them one at a time and deposit them outside the cave. It is not as simple as this, however. Lurking in the cave are creatures who eat you up after pursuing you through the caverns, unless you've just passed over a power pack, when you can for a few seconds destroy them. This game is entertaining and more difficult than it at first appears.

Ghost Attack is a rather more familiar game of gobbling up proton pills in a maze while avoiding the attentions of three ghosts (unless you've recently passed over an "energiser"). There are three levels of difficulty, "easy", "hard", and "tuff", and it's certainly fun to play, but you may wonder as I did, if it is indeed worth £5 more than the other cartridges.

Berserk, the last cartridge, is based on a popular arcade game that does not often appear in a version for home computers. Again, it is shame that the Dragon palette is so limited in high-resolution modes that it only appears in black and white. You control a small man in a series of large inter-connecting rooms. Robots inhabit the maze and you have to destroy them while avoiding their lasers and the electrified walls. As you move off the edge of the screen, another series of rooms appears. There is also the complication of "Evil Orville", a smiling bouncing ball who cannot be destroyed. This cartridge is great fun and the graphics are very good.

There are eight cassettes available. They cover home finance, utility packages, adventure and general games. The first, *Special Selection 1*, contains four games that are designed to tax brain and memory power, rather than hand/eye co-ordination as do the arcade cartridges.



Some of the cartridges from Dragon Data's software range.

Brain chooses two characters from the keyboard and awards or removes points as a clue to how close you are to success. "This will make your brain ache" states the screen — a reasonably accurate statement until you begin to work out strategies. Four is a version of Connect Four, played by two players on a large grid — in fact a larger version of noughts and crosses. A reasonable game, but rather simple graphics.

Horse is hardly educational, unless you need to be shown the foolishness of allowing animals to control your cash-flow. Up to nine players can bet on their choice and the computer uses pretty graphics to show the race in full colour. Simon is the familiar sound/memory game that increases in difficulty by giving you more and more notes to recall in the correct order. Coloured dragons act as an aide memoire.

As a cassette, Special Selection 1 offers good value, containing four reasonable games. The notes state "look in the listings to get ideas for your own programs and also find how to program for particular effects". It is a pleasant surprise to find games software being put to instructional use and increases the value of the cassette enormously.

Examples from the Manual is just what it says — 50 or so small demonstration programs. It seems to rather defeat the object of learning by working through the manual, but if you hate typing then you may find some use for this cassette.

Graphic Animator uses joysticks to draw designs on the screen and load them into the page memory. The pages can then be flicked through at a chosen rate to give a cartoon effect. The idea is superb but the joysticks are hypersensitive and the drawing routine so fast that the results are not as clear as would be wished, even with practice and a steady hand. As it is written in machine code, it is not possible to alter from the keyboard so I hope that Dragon Data will rewrite this program as the idea is worth developing. At present, however, this cassette does not represent such good value.

Personal Finance is a home money management package consisting of three programs. Family Budget uses Dragon's



DRAGON 32

cassette filing capability to keep track of incomes, standing orders, etc, and allows you to follow the state of your balance. It is more useful than relying on your bank. My manager always waits until the eleventh month before informing me how overdrawn my budget account is!

Family Accounts uses one data file to handle up to 20 accounts. This program, although necessarily limited, does demonstrate the possible future use of the Dragon in small business applications, particularly when the larger memory becomes available.

Family Address also uses a single data file to hold up to 80 names, addresses and phone numbers. The program finds names swiftly and if you cannot spell, will patiently go through all the entries starting with a particular letter. The business potential is again demonstrated, but it did occur to me that it was still a little quicker to look up numbers in my address book. All three programs are menu-driven and the cassette is good value.

Special Selection 2 also uses the filing/handling system in a couple of programs. Database and Dragon. Another program, Index, shows how two files can be manipulated. Dragon is a rather weak version of Hangman, but does show how different words may be loaded separately which would be a useful facility in an educational situation.

The best program on the cassette, however, is Music. This prints out a slave and allows you to enter notes, play them, alter their time and pitch values and even

store them as data on a tape to be incorporated in your own programs. Another tape that is good value for money.

Computavoice is quite an amazing tape. When I first acquired a Dragon, I was disappointed with the sound — it is not as steady and pure as the amplified Spectrum sound and can in no way compete with the sophisticated BBC facilities. I therefore viewed this cassette with some suspicion.

A machine code routine contains the working section and can be incorporated in your own programs to sneer at inferior games players or encourage children using learning packages. There is a demonstration program in Basic that will speak the numbers one to nine as you press the relevant keys. The quality cannot approach the standard of specialist hardware like Mutek's Voxbox or any of the Texas speech synthesizers, but at less than £8, it offers excellent value.

It also teaches the principles of phonemic voice production. In other words, it is no good typing "FIVE" as a speech string, or you get something like "FEVEH". If you enter "F<1.6EV" then it is almost recognisable. As with all Dragon software, the documentation is excellent and the tape is easier to use than may appear from the above.

I have left the ITC adventure programs until last as I have to admit to being an addict to this sort of program. Quest contains elements of Kingdom as well as Adventure. You start off with 10 men, an assortment of equipment and the objective of storming Moorlock's Citadel.

A map of your progress appears and until last as I have to admit to being an addict to this sort of program. Quest contains elements of Kingdom as well as Adventure. You start off with 10 men, an assortment of equipment and the objective of storming Moorlock's Citadel.

A map of your progress appears and until last as I have to admit to being an addict to this sort of program. Quest contains elements of Kingdom as well as Adventure. You start off with 10 men, an assortment of equipment and the objective of storming Moorlock's Citadel.

That concludes the first dip into the Dragon's lair. Many more software houses are starting to produce programs for this machine. Apart from a few minor points, Dragon Data has set a high standard for the others to follow.

Cartridges	Joystick	Cost*	Value (1-10)
Berserk	Y	£19.95	8
Meteoroids	N	£19.95	7
Cosmic Invaders	N	£19.95	6
Ghost Attack	Y	£24.95	7
Cave Hunter	Y	£19.95	8
Starship Chameleon	Y	£19.95	7
 Cassettes			
Dragon Special Selection 1		£7.95	8
Dragon Special Selection 2		£7.95	9
Quest		£7.95	9
Madness and the Minotaur		£7.95	8
Graphic Animator		£7.95	5
Computavoice		£7.95	9
Examples from manual		£7.95	5
Personal Finance		£7.95	9

*Cassettes usually these prices — Cartridges available at up to 10 per cent discount at some outlets.

OPEN FORUM

Open Forum is for you to publish your programs and ideas. Take care that the listings you send in are all bug-free. Your documentation should start with a general description of the program and what it does and then give some detail of how the program is constructed. We will pay the *Program of the Week* double our new fee of £6 for each program published.

Colour Graphics

on Vic 20

Multicolour graphics is a function which has not really been explored to the full on the Vic20 computer. Since this function is easily accessible, I decided to write a program to demonstrate it.

My program is one of moods. It begins with a gentle mixture of red and white on a plush, red background. The feeling here is one of calm and tranquility. This is swiftly followed by a profusion of much stronger

colour, in multi-colour mode, startlingly beautiful in its complexity.

The flashing effect appears to become more pronounced with the addition of sound which starts half-way through at a fairly low pitch and builds up into a crescendo, ending in a resounding crash. Of course, there is no actual difference in the power of the swiftly-changing graphics, despite the illusion, but the effect on the viewer is one of exciting expectancy.

After this mind-blowing interval the mood once again reverts to the sudden calmness of slowly-changing colours. This

signifies the end of the program, but my inclusion of a Goto enables the program to re-run itself automatically.

An escape may be engineered by depressing any key during the colour sequence on the green background. This brings about a crashing sound and the program is at an end.

Program notes

Lines	
100 to 140	Set up sound registers
150	Print title
151	Set up Graphics Mode
152 to 153	Set up foreground/background colours and multi-colour Mode
220	Choose random colour for the square
310	Provide user with an escape from the program
490 to 600	Define Graphics characters
1000 to 1050	Choose Graphics characters to be displayed
2050 to 2500	Subroutine to place characters or colours on to screen
4000 to 4010	Crash subroutine

```
100 POKE36874,0
110 POKE36875,0
120 POKE36876,0
130 POKE36877,0
140 POKE36878,0
150 POKE36879,42:PRINT":J*** VIC KALEIDOSCOPE ***":FORI=1TO2000:NEXT:PRINT":J"
151 POKE36869,255:GOSUB490:GOSUB1000
152 POKE36879,29
153 POKE646,10
160 Z=38400:Q=Z+21
160 E=Z+84:R=Z+505
200 FORJ=0TO10
210 FORI=0TO12
220 X=INT(RND(1)*8+INT(RND(1)*8+1))
230 GOSUB2050
310 GETA$:IF A$<>""THEN350
320 NEXT
330 FORK=1TO200:NEXT
335 NEXT:POKE36878,15:FORI=0TO240:POKE36879,I
340 FORJ=0TO125:NEXT:POKE36876,I:GOSUB3000:POKE36875,I:POKE36874,I:POKE36877,I
350 NEXT:GOSUB4000:POKE36879,29:PRINT":J":POKE36879,27
360 POKE36869,240:END
400 POKE56,28:POKE52,28:RESTORE:FORI=0TO39:PERIA:POKE7168+I,R:NEXT
500 DATA0,0,0,0,0,0,0
510 DATA240,240,240,240,15,15,15,15
520 DATA255,129,189,165,165,189,129,255
530 DATA255,61,61,61,61,61,61,255
540 DATR170,170,170,170,170,170,170,170
550 FORI=720TO7215:POKE1,INT(RND(1)*255+1):NEXT
600 RETURN
1000 Z=7680:Q=7680+21
1010 E=7680+434:R=7680+505
1020 FORJ=0TO10
1030 FORI=0TO12
1040 X=INT(RND(1)*5+1)
1050 GOSUB2050:NEXT:NEXT:RETURN
2050 POKEZ+J*23+I,X
2060 POKEO+J*21-I,X
2070 POKEZ+J*23+I*22,X
2080 POKEQ+J*21+I*22,X
2090 POKEE-J*21+I,X
2100 POKER-J*23-I,X
2110 POKEE-J*21-I*22,X
2120 POKER-J*23-I*22,X
2500 RETURN
3000 POKE36878,INT(1/15):RETURN
4000 POKE36874,0:POKE36875,0:POKE36876,0
4001 POKE36879,29:POKE36877,200:FORI=
15T00STEP-.1:POKE36878,I:FORJ=0TO20:
NEXT:NEXT
4010 POKE36877,0:RETURN
```

Colour Graphics
by William Stenning

Asteroids

on BBC Micro

This game for the A and B model BBC computer system runs in MODE 5 with full colour, sound and user definable graphics.

```

5 ZX=0;SY=0
10 GOTO550
20 ENVELOPE1,1,-5,5,-5,20,20,20,50,-25,0,-20,100,60
30 MODE$((A=500;SC=0):GDU1 9,3,2;0)
40 VDU23,255,240,252,255,127,63,60,60,60
50 VDU23,254,60,63,128,255,127,63,60,60,60
60 VDU23,251,60,124,124,127,255,254,63,60
70 VDU23,250,24,60,60,126,126,66,66,66
80 VDU23,240,60,126,219,255,255,66,126,60
90 VDU23,241,63,127,250,255,255,255,127,63
100 VDU23,242,252,254,255,255,255,254,254,252
110 GDU30:PRC$HIP
120 VDU5
130 COLOR$1:PRINTTAB(RND(20),1):CHR$(RND(13)+252)
140 IF RND(1)>.9 THEN PRCHAKE
150 IF RND(1)<.5 THEN PRCHAKE
160 VDU30:VDU11
170 VDU5
180 A$=INKEY$()0
190 IF A$="Z" THEN A$=THENA-A+48
200 IF A$="M" THEN A$=THENA+110:THENA=A+48
210 #FX11,1
220 #FX15,0
230 SOUND1,1,100+(SC$0),100
240 IFPOINT(A+32,208)=2 THEN PRCD$DESTROY
250 IFPOINT(A+32,208)=2 THEN PRCD$DROP
260 IFPOINT(A+32,208)=2 THEN PRCD$CALLEN
270 D$=2:PRC$SHIP:$X=$X+1
280 GDU10
290 DEFPROC$SHIP
300 DCOL0,0:MOVEA,200:PRINTCHR$(250)
310 IFPC(MOVEA,144:PRINTCHR$(240)
320 ENDPROC
330 DEFPROC$DESTROY
340 VDU4
350 FOR A=10 TO 15: SOUNDO,1,A$2,A$NEXT
360 #FX11,0
370 PRINTTAB(10,10):B%
380 #FX15,0

```

Bin/dec

on ZX81

This program will convert decimal numbers into binary numbers and vice versa. You are told which letter to enter for the function you need. After you have made your choice the screen is cleared and the program continues with the function you wish.

What the function does is displayed at the top of the screen. Then the number

you want is calculated and printed. The program then pauses. Pressing any key will re-run the program.

Program notes for decimal to binary

B0 to 70 reserve space for AS. B0 waits until a number is input. 60 lets X be your input number so that in line 170, Y is your original number. 100 halves your number. 110 to 150 check the remainder of the result of line 100 and allocates the correct binary digit to AS. 120 removes the remainder after the division in 100. 130 checks to see if the number has been converted to binary.

The general idea of the game is to collect as many aliens as possible and to deposit them in their yellow bases. Collision with the red asteroids ends the game. This listing works perfectly and will provide a challenge to other readers.

```

380 IF SY>HZ THEN HZ=SY
390 GS=GET$:GOTO550
400 ENDPROC
410 DEFPROMAKE
420 COLOUR$1:PRINTTAB(RND(18),1):CHR$(240)
430 DEFPROMAKE
440 DEFPROMAKE
450 COLOUR$2:PRINTTAB(RND(18),17):CHR$(241):CHR$(242)
460 DEFPROMAKE
470 DEFPROMAKE
480 SX=SX+10
490 SC=SC+1
500 ENDPROC
510 DEFPROCDROP
520 SX=SX+(SC$0)
530 SC=0
540 ENDPROC
550 CLS:CLEAR
555 MODE7

560 PRINTTAB(12,21):CHR$(129):CHR$(141):"SALVAGE"
565 PRINTTAB(12,31):CHR$(129):CHR$(141):"SALVAGE"
570 PRINTTAB(11,41):CHR$(129):"
580 PRINTTAB(2,51):CHR$(130):"The idea of the game is to collect as many aliens as possible and take them"
590 PRINTTAB(1,71):CHR$(130):"many aliens as possible and take them"
600 PRINTTAB(1,91):CHR$(130):"back to their yellow bases. The only"
610 PRINTTAB(1,91):CHR$(130):"problem is, that if you hit the"
620 PRINTTAB(1,101):CHR$(130):"asteroids, you blow up."
630 PRINTTAB(12,121):CHR$(133):CHR$(136):"- M"
640 PRINTTAB(10,141):CHR$(131):"HIGH SCORE":H%
650 PRINTTAB(16,201):CHR$(131):CHR$(136):"YOUR SCORE":I%
660 PRINTTAB(16,207):CHR$(131):CHR$(136):"Press any key to start."
665 SC=0
670 GS=GET$:GOTO20

```

Asteroids

by Duncan Worrell

140 to 160 lets BS=AS but in reverse to get the correct binary number
170 prints the decimal number and its equivalent in binary.
179 prints the decimal number and its equivalent in binary.

Program notes for binary to decimal

200 waits for you to input your binary number.
210 the decimal counter is set to zero.
220 sets up a loop counter as long as the binary number you have input.
230 searches for the digit 1 in your binary number.
240 if finds one it increases the D counter by its equivalent decimal value.
249 continues this until each digit has been checked.
250 prints its equivalent decimal number.

```

10 PRINT "INPUT D FOR DEC. TO BIN."
20 PRINT "INPUT B FOR BIN. TO DEC."
30 INPUT C$
40 CLS
50 IF C$="B" THEN GOTO 190
55 PRINT "CONVERSION FROM DEC. TO BIN."
60 LET AS=""
70 LET BS=""
80 INPUT Y
90 LET X=Y
100 LET X=X/2
110 IF INT X<0 THEN LET AS=AS+"1"
115 IF INT X>0 THEN LET AS=AS+"0"
120 LET X=X INT
130 IF X<0 THEN GOTO 190

```

```

140 FOR A=1 TO LEN AS
150 LET BS=BS+A*B$
160 NEXT A
170 PRINT Y;"=";BS
180 GOTO 260
190 PRINT "CONVERSION FROM BIN. TO DEC."
200 INPUT AS
210 LET D=0
220 FOR H=1 TO LEN AS
230 IF AS(H)>"1" THEN LET D=D+2^(H-1)*AS(H)
240 NEXT A
250 PRINT AS;"=";D
260 PAUSE 4E4
270 CLS
280 RUN

```

Bin/dec
Anonymous

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OPEN FORUM

Bomber

on Spectrum

This is a Spectrum version based on the popular arcade game. Your plane is circling over the city, each time losing altitude. Your only chance is to bomb away the city

and clear a space to land. Beware, only one bomb may be dropped at a time so aim well!

The difficulty applies to the height of the skyscrapers and the descent rate determines how many passes you make at each level. I have never managed to win on

"Fast descent rate". Use "space" to drop a bomb. The game uses a For-Next loop (lines 70 and 90) for the position of the plane. I have used Attr for checking rather than Screen\$, as the latter gives a null \$ for user defined graphics.

```

1 GO SUB 420: GO SUB 340
2 LET SC=0
3 LET b=0
4 LET f=0 LET g=0
5 CLS : BORDER 0: PAPER 9
6 INK 6: CLS
7 PRINT AT 21,0, " "
22 INK 7:f=2 TO 22 STEP 2
40 FOR g=20 TO 28-1:RAND$(4+6$)
1 STEP -1: PRINT BRIGHT 1:AT g,f
10 CMRS 144:CHR$ 144: NEXT g: PRINT
AT g,f: BRIGHT 1;" ". NEXT f
50 LET a=1
70 FOR i=0 TO 29
75 IF ATTR(a,i)+3>60 THEN 80
TO 200
80 PRINT INK 7:AT a,i;" ":
THEN IF b=0 T
HEN BEEP .05:05 GO TO 300
85 IF b>0 THEN GO TO 320
87 FOR v=1 TO 6: NEXT v
90 NEXT f
95 PRINT AT a,f;" "
100 LET a=a+d$: IF a>=20 THEN 9
TO 600
110 GO TO 70
200 FOR i=1 TO 100
210 PRINT AT a,f;" "
220 PRINT AT a,f;"++"
230 NEXT i
240 CLS
250 PRINT "You crashed!"
260 PAUSE 0
270 RUN
300 LET b=a
310 LET b1=f+2
320 PRINT AT b,b1;" "
330 LET b=b+1
335 IF b>20 THEN LET b=0: GO TO
90

```

```

340 IF ATTR(b,b1)>60 THEN LET
SC=5C+1: PRINT AT 0,0,"Score=",S
C: GO TO 400
350 PRINT AT b,b1, INK 1,CHR$ 1
45 BEEP .01:GO TO 90
400 PRINT AT b,b1, INK 7,CHR$ 1
45
405 IF ATTR(b,b1-1)>60 THEN PR
INT INK 7: PRINT AT b,b1-1,CHR$ 1
460 AT b-1,b1-1;" ".BEEP .1,10:
LET b=0: GO TO 90
410 PRINT INK 7:AT b,b1+2:CHR$ 1
465: PRINT AT b-1,b1+1;" "
1,10: LET b=0: GO TO 90
415 FOR f=0 TO 7: READ X: POKE
USR "C"+f,X: NEXT f
420 FOR f=0 TO 7: READ X: POKE
USR "A"+f,X: NEXT f: READ Y: PO
KE USR "C"+f,Y: NEXT f: READ X: H
430 DATA 265,125,129,68,265,24,
129,50,255,126,126,255,50,18
9,24
440 DATA 0,0,34+128,50+128,45+1
28,53+128,128+45,192+45
560 PRINT AT 20,0;"--";AT 10,0;
"You landed!" 
610 FOR f=1 TO 700: NEXT f: ALSO
480 INPUT "Difficulty 1=easy 10
hard":d
500 IF d<1 OR d>10 THEN GO TO 8
490
550 INPUT "Rate of descent":dr
570 2*5000?4*:dr
555 IF dr<1 OR dr>2 THEN GO TO
555
557 IF dr=2 THEN LET dr=-5
560 RETURN

```

Bomber
by Nick Wilson

Bugsplat

on Vic 20

Bugsplat is an interesting program for the unexpanded Vic-20. It is based on the game of Beetle where you have to build a beetle up by throwing a dice. When the computer tells you to stop the dice press

the top function key. Then the computer will give you the corresponding part providing you have not got it already.

However, there is a catch. When you build your bug you must start with a body and build the pieces you gain directly on to it. If this is not possible then you cannot use the piece and must miss your go.

Lines with graphics are as follows:

```

140 |HOME|RED|1|CD||SHIFT O|3 COMMODORE
SHIFT T||SHIFT F|CD||SCL||COMMODORE SHIFT
G||3SPC||COMMODORE SHIFT M||CD||SCL|
145 |COMMODORE SHIFT
M||CD||SCL||COMMODORE SHIFT
F||3SPC||COMMODORE SHIFT
G||3SPC||COMMODORE SHIFT M||CD||SCL||SHIFT
L||3SPC||SHIFT ir |

```

```

0 REM BUGSPLAT BY M.MARTIN
1 DIMPT(1,5),DC$(5),PT$(5),MX(5)
10 POKE36879,110
20 PRINT"BUG SPLAT!!"
30 PRINT"THE OBJECT OF BUGSPLAT IS TO BUILD UP";
35 PRINT"UR BUG BY THROWING A ";
40 PRINT"DICE AND ADDING THE CORRESPONDING PIECE."
42 PRINT"DEPRESS KEY"
45 GOSUB100
47 PRINT"";
50 PRINT"DICE PIECE NEEDED"
60 PRINT"-----"

```

PROGRAM OF THE WEEK

```

70 PRINT" 1 BODY 1"
80 PRINT" 2 NECK 1"
90 PRINT" 3 HEAD 1"
100 PRINT" 4 FEELERS 2"
110 PRINT" 5 TRAIL 1"
120 PRINT" 6 LEGS 6"
130 FORA=0TO5:READDC$(A):NEXT:FORA=0TO5
135 READPT$(A):NEXT:FORA=0TO5:READMX(A):NEXT
140 PRINT"#####0000000000#####0000000000#####";
145 PRINT"1 #####0000000000#####"
150 FORA=0TO5:PRINT"";
155 POKE36878,15:POKE36876,220+A#5
160 PRINT"#####0000000000#####";DC$(A)
170 PT(A,A)=-1*(A>3ANDR>5)-2*(A=3)-6*(A=5)
180 GOSUB2000:FORB=1TO1000:NEXTB,A
190 POKE36876,0:POKE36878,0
200 PRINT"#####PRESS # KEY":POKE198,0
210 GETA$:IFR$="#THEN210
220 POKE36879,93
225 PRINT"";
230 GOSUB4000
240 FORR=0TO5:PT(0,A)=0:NEXT
250 PRINT"#####YOUR BUG":P1=0
260 PRINT"#####MY BUG":PL=1:GOSUB2000
261 B=0:FORR=0TO5:IFPT(1,A)=MX(A)THENB=B+1:NEXT:IFB=-6THEN6000
262 DC=INT(RND(1)*6):POKE198,0
265 GOSUB4000
270 IFDC=6THENDC=0
272 PRINT"#####DC$(DC)":DC=DC+1
275 PRINT"#####PRESS F1"
276 PRINT"#####STOP DICE"
277 POKE36878,15:POKE36876,RND(1)*128+128
280 GETA$:IFR$("<")#THEN270
285 POKE36876,0
290 GOSUB4000:F1=2:DC=DC-1
300 GOSUB5000
370 PRINT"#####";
372 IFF1=0THENPRINT"YOU NEED A":PRINT"#####";PT$(DC)
375 IFF1=0THENPT(0,DC)=PT(0,DC)+1
380 IFF1=1THENPRINT"YOU DON'T ":"PRINT"#####NEED A ",PT$(DC)
390 IFF1=2THENPRINT"YOU CAN'T ":"PRINT"#####HAVE A ",PT$(DC)
400 REM COMPUTER MOVES
405 FORA=1TO3000:NEXT:GOSUB4000:P1=1
410 PRINT"#####MY MOVE"
420 PRINT"#####OUR BUG"
430 PL=0:GOSUB2000:DC=INT(RND(1)*6)
435 B=0:FORR=0TO5:IFPT(0,A)=MX(A)THENB=B+1:NEXT:IFB=6THEN6000
440 FORA=1TO50:PRINT"#####DC$(RND(1)*6)":POKE36878,15
441 POKE36876,RND(1)*128+128:NEXT
442 POKE36878,0:POKE36876,0
445 GOSUB4000:PRINT"#####I'VE ROLLED":PRINT"##### A":DC+1
450 PRINT"#####DC$(DC)"
460 FORR=1TO1000:NEXT:GOSUB4000:F1=2
470 GOSUB5000
480 PRINT"#####";
485 IFF1=0THENPRINT"I NEED A":PRINT"#####";PT$(DC)
490 IFF1=0THENPT(1,DC)=PT(1,DC)+1
500 IFF1=1THENPRINT"I DON'T ":"PRINT"#####NEED # ";PT$(DC)
510 IFF1=2THENPRINT"I CAN'T HAVE ":"PRINT"##### "PT$(DC)
515 FORA=1TO3000:NEXT

```

Turn to page 20

OPEN FORUM

```
from page 19
999 GOTO250
1000 GETA$: IFR$="THEN1000
1010 RETURN
2000 IFPT(PL,0)=0THENRETURN
2010 PRINT"0001" 0000000000000000
2020 IFPT(PL,1)=0THEN2040
2030 PRINT"0000000000000000"
2040 IFPT(PL,2)=0THEN2060
2050 PRINT"0000000000000000"
2060 IFPT(PL,3)=0THEN2090
2070 IFPT(PL,3)=1THENPRINT"0000000000000000"
2080 IFPT(PL,3)=2THENPRINT"0000000000000000"
2090 IFPT(PL,4)=0THEN2110
2100 PRINT"0000000000000000"
2110 IFPT(PL,5)=0THENRETURN
2120 PRINT"0000000000000000LEFT$("LLLLL",PT(PL,5))PRINT"0000000000000000"
2999 RETURN
3000 DATA" 0000000000000000 "
3010 DATA"0 0000000000000000 "
3020 DATA"0 0000000000000000 "
3030 DATA"0 0000000000000000 "
3040 DATA"0 0000000000000000 "
3050 DATA"0 0000000000000000 "
3060 DATABODY,NECK,HEAD,FEELER,TRIL,LEG,1,1,1,2,1,6
4000 PRINT"0000000000000000"
4010 PRINT"0000000000000000"
4020 PRINT"0000000000000000"
4030 PRINT"0000000000000000"
4040 PRINT"0000000000000000"
4999 RETURN
5000 IFPT(P1,0)=0ANDDC=0THENF1=0
5005 IFPT(P1,0)=1ANDDC=0THENF1=1:RETURN
5010 IFPT(P1,0)=1ANDDC=1THENF1=0
5020 IFPT(P1,1)=1ANDDC=2THENF1=0
5030 IFPT(P1,2)=1ANDDC=3THENF1=0
5040 IFPT(P1,0)=1ANDDC=4THENF1=0
5050 IFPT(P1,0)=1ANDDC=5THENF1=0
5060 IFF1=0ANDPT(P1,DC)=MX(DC)THENF1=1
5999 RETURN
6000 GOSUB4000:IFB>0THENPRINT"0000000000000000YOU WIN":PRINT"0000000000000000WELL DONE"
6010 IFB<0THENPRINT"0000000000000000WIN":PRINT"0000000000000000BAD LUCK"
6020 FORA=1TO3000:NEXT
6030 GOSUB4000:PRINT"0000000000000000ANOTHER":PRINT"0000000000000000 GO ON"
6040 GETA$
6050 IFR$="Y"THENRUN
6060 IFR$<>"N"THEN6040
6065 PRINT"J"
6070 END

DEATH
```

Bugsplat
by Mike Martin

Memory

on Vic20

This program, for a Vic with 8K or 16K expansion, will rearrange the Vic's memory to allow the use of a user-defined character generator. It moves the start of Basic to 8192 and the display file from 4096 to 7680, as on an unexpanded Vic. This leaves the area between 4096 and 7679 free for a new character generator or

a machine code program.

The register 36869 will be set to use the normal character set, but should be poked with 252 if use a defined character set. Having the character generator before the start of basic is an advantage because no memory has to be reserved and there is no chance of basic overwriting the characters.

No problems should occur if this program is run before loading the desired program.

Program

```
10 POKE 648,30 POKE 36866,150
20 POKE 641,0 POKE 642,32
30 PLINE 36869,24
40 POKE 43,1 POKE 44,32
50 B199,B PRINT [or]
60 POKE CLR NEW
```

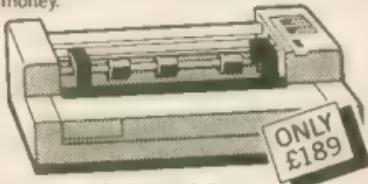
Program notes

Line(s) Move screen
20 Memory start
30 Normal Vic character set.
40 to 60 Move start @ basic

Memory
by Anthony Collyer

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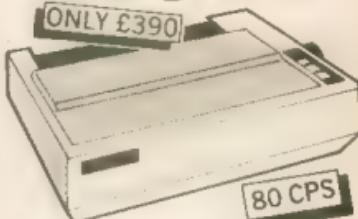
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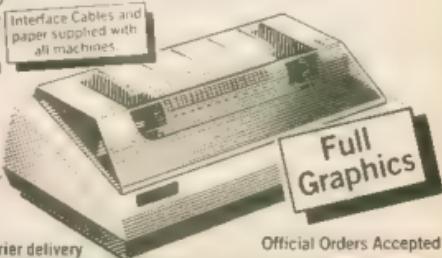
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Fashioning by whimsy

In part three of our extract from *The Working Spectrum* we continue adding modules/subroutines to the Unifile program, designed to enable a single program to cover a variety of filing tasks without the need for constant re-writing every time a new use comes along.

MODULE 1.1.3

This is the module which permits Unifile to assume different shapes according to the whim of the user. In the course of the module the major arrays and variables are set in preparation for the data to come. Note that one result of this is that any previously stored data is lost. We shall not discuss the use of the various arrays in detail here, preferring to leave that task until we actually begin to use them.

Commentary

Lines 1230-1340. A typical entry to the file might consist of name, address, age and telephone number. In the course of these lines the program records how many such items there will be in each entry in the variable X. The names of the items are requested and stored in the array AS, an indicator having been attached by the subroutine at line 2780. Note that we print QS stripped of its first character, since the indicator is not a meaningful character.

Line 1350 is the main array in which the entries will be stored.

Line 1360 sets up two dummy entries which will mark the beginning and end of the file.

Lines 1370-1380. Two examples of user-defined functions which could just as well be replaced by single line subroutines. The first function extracts the value of a pointer and will be explained in the course of Module 5. The second function extracts a single item from the main file based on the value of the indicator found at position C in the file.

Line 1390. P is the variable used to record the first empty space in BS. BS will always be 28,000 characters long but we will use only part of it. Clearly we need to know how much is already in use.

Line 1400. YS stores the pointers in the form of character codes, a method that is discussed in relation to Module 5.

Line 1410. N is the variable which records the number of entries in the file.

Testing Module 1.1.3

We can now test Modules 2 and 3. Run the program and select function 1 from the

More of the Unifile program will be presented next week.

This is an extract from *The Working Spectrum*, by David Lawrence (price £5.85) published by Sunshine Books, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

menu. You should be able to specify a number of items and then give them names. Having done this, stop and program and, in direct mode, print out the various arrays and variables as follows.

BS ??? COPY
YS ????

N: 2

P: 5

X should equal the number of items you specified and the array AS should have X items, each containing an item name with an indicator tacked on to the front.

MODULE 1.1.4

The purpose of this module is to accept the input of an entry composed of the correct number of items and to present that entry in the section of the program

which will insert it into its correct place in the file.

Commentary

Line 1600. RS is the entry and is composed of a number of successive Q\$'s added together.

Testing Module 1.1.4

If you have already entered some sensible item names then start the program with Goto 1 and call up function 2 from the menu. You should be asked for an input for each item name. After the correct number of item names the program will stop with the report 0 OK,1630.1. The file size should be 4/28000 and, if you print out RS it should consist of your items, each preceded by an indicator character. ■

UNIFILE: Module 3

```

1200 REM *****
1210 REM ENTRY STRUCTURE
1220 REM *****
1230 PRINT PAPER 2; .. FILE
STRUCTURE
1240 PRINT "HOW MANY ITEMS IN "
1250 INPUT X
1260 CLS
1270 DIM AS(X,20)
1280 PRINT PAPER 2; .. NAMES
OF ITEMS
1290 FOR I=1 TO X
1300 PRINT "ITEM "; I; ":"
1310 GO SUB 2780
1320 PRINT QS(2 TO )
1330 LET AS(I)=QS
1340 NEXT I
1350 DIM BS(28000)
1360 LET BS(1 TO 4)=CHR$ 2+CHR$
0+CHR$ 2+CHR$ 255
1370 DEF FN A()=255*CODE Y$(2$5-
1)+CODE Y$(2$5)
1380 DEF FN A$()=BS(C TO C+CODE
B(C)-1)
1390 LET P=5
1400 LET Y$=CHR$ 0+CHR$ 1+CHR$ 0
+CHR$ 3
1410 LET N=2
1420 RETURN

```

UNIFILE: Module 4

```

1430 REM *****
1440 REM NORMAL INPUT
1450 REM *****
1460 LET R$=""
1470 PRINT PAPER 2; .. EN
TRIES
1480 PRINT "COMMANDS AVAILABLE:
1490 PRINT ">>ENTER ITEM SPECIFI
ED" "ZZZ" TO QUIT"
1500 PRINT *****
1510 PRINT "FILE SIZE:";P-1;"//";
LEN BS
1520 FOR I=1 TO X
1530 GO SUB 2810
1540 GO SUB 2780
1550 PRINT QS(2 TO )
1560 IF QS(2 TO )="ZZZ" THEN RET
URN
1570 LET R$=R$+QS
1580 NEXT I
1590 CLS
1600 GO SUB 1660
1610 GO TO 1440

```

Whorled graphics

Simon Cross presents a spiral printing routine for the ZX81.

This program is a 114 byte machine code routine which prints a character, chosen by the user, in a "spiral" form from the edge of the screen to the centre. It runs on the Sinclair ZX81 with more than 3½K (with slight modification it will run on the unexpanded ZX81). The program produces a 32 x 24 display on the ZX81 with more

than 3½K — in the unexpanded ZX81 the display is 32 x 22.

Initially, I wrote this routine to be used as a "fancy" C64 routine to brighten up some of my Basic programs, but I think that it has enough intrinsic interest to be the core of a "pattern-making" program.

The routine is quite simple, consisting of a main loop which itself contains four smaller loops which print the four edges of the pattern. I needed to put a delay loop between each printing of a character, since without these the pattern appeared to be printed instantaneously. The character to be printed on to the screen is stored in location 16514. The rest of the routine could be relocated in the memory since it

contains no absolute jumps.

To enter the machine code, first *Poke* the code into a *Rem* statement in line 1 which contains 114 characters. Most readers have probably developed their own methods of entering machine code by now, but I have included my own loading program. After this program has been entered it should be *Run* and the machine code entered one byte at a time. The address and entered code will be scrolled up the screen.

The short demonstration program prints various randomly selected characters on to the screen and can be enjoyed as a "pattern-making" program. Just enter the Basic program once the machine code has

Line	Hex	Dec	Description	Notes
5514	00		location storing character to be printed	
	21 02 AD	81 02 AD	LD HL {16514}; load HL with OPTIC pointer	
	56		LD B (HL)	
	25		INC HL	
16520	56		LD D (HL)	
	28 00 40	88 00 40	LD HL (0);	
	19		LD HL D;	HL now contains address of 1st byte display
	33 42 41	83 42 41	LD BC {16514};	load address which contains character to be printed
	0A		LD A (HL)	
16524	16 21	46 21	LD D (33)	load D with row length variable
	16 18	46 18	LD A (2a)	load A with column length variable
	05 28	15 28	LD B (11)	load B with counter for main loop
	C9		POP BC	start of main loop
	15		DEC D	
	47		LD B D	load row length into loop counter
	21		LDZ HL	start of upper row print loop
	20		LD (HL) A	print a character onto the screen
16527	2B		PUSH BC	
	06 FF	16 FF	LD B (235)	
	3C F1	13 C1	LDNE (-2)	delay loop
	79		POP BC	
	10 AF	20 AF	LDNE (-10)	end of upper row print loop
	52		DEC A	
	25		LD B E	load column length into loop counter
1652C	25		PUSH BC	start of R/H column print loop
	16 21	46 21	LD B (33)	
	25		INC HL	
	10 FD	20 FD	LDNE (-3)	
	27		POP BC	
	21		LD (HL) A	print a character onto the screen
	19		DECB BC	
16530	16 20	46 20	LD B (235)	
	1F 9E	1F 9E	LDNE (-2)	delay loop
	20		10 FD	
	10 FD	20 FD	LDNE (-16)	end of L/R column print loop
	37		LD B D	
	25		LD B D	load row length into loop counter
	25		LDZ BC	start of lower row print loop
	21		LD (HL) A	print a character onto the screen
16537	20		PUSH BC	

PROGRAMMING

been Poked into the Ram statement and then Run the whole program. To use the routine in any other program, Poke the decimal code of the character to be printed into location 16514. The routine is called by *Rand Usr* 16515.

1K ZX81 modifications

The collapsed display file needs to be filled out before Poking characters into it. Add the following lines to the pattern-making program:

```
5 FOR N = 0 TO 21
6 PRINT "—32 spaces—"
7 NEXT N
```

Since I do not know a simple way of filling out the bottom two lines of the display file, I reduce the display to 32×22 by altering the machine code with the following direct commands.

```
POKE 16532, 22
POKE 16534, 10
```

Initial program to load machine code

```
1 REM XXXXXXXXXXXX—total of 114 X's—
XXXXXXXXXXXXXX
10 FOR N = 16514 TO 16627
20 INPUT AS
30 LET A = 16 + CODE(AS) - CODE(AS$(2)) - 476
40 POKE N, A
50 SCROLL
60 PRINT N; ":"; AS
```

```
70 NEXT N
80 SCROLL
90 PRINT "END"
```

Program to demonstrate machine code routine

```
1 REM machine code routine
10 LET K = 4 + RND + 10
20 LET Y = 129 + RND + 15
30 POKE 16514, X
40 RAND USR 16515
50 POKE 16514, 128
60 RAND USR 16515
70 POKE 16514, 15
80 RAND USR 16515
90 POKE 16514, 0
100 RAND USR 16515
110 RAND
120 GOTO 10
```

	REG. OR IN	WHAT'S IT?	BLT
ATN-13	10, 14	LD B (255)	
	11, 14	LDH C (-2)	delay loop
	21	IN BC	
	11, 16	LDH A (-1)	end of inner screen print loop
	10	LD D A	
	13	LD B #	load column length into loop counter
16514	15	LDH B \$C	start of L/R column print loop
	16, 20	LD B (\$5)	
	19	LD A B	
	10, 20	LD A B + 5	
	21	IN A BC	
	11, 20	LD A (-1), A	print a character onto the screen
	25	LD B BC	
Loudy	10, 24	LD B (255)	
	11, 24	LDH C (-2)	delay loop
	21	IN BC	
	10, 25	LDH A (-1)	end of L/R column print loop
	21	POP BC	
16515	10, 30	LDH C (-6a)	end of wait loop
	15	LD D D	start of fill center routine
16600	16	LD B B	load loop counter with nr. length
	23	LDH BC	
	17	LD A B	print a character onto the screen
	25	PSH BC	
	16, 27	LD B (455)	
	10, 28	LDH C (-2)	delay loop
	21	IN B BC	
16609	10, 28	LDH C (-1)	
	16, 28	LD B (115)	
	11	LD C 115	
	10, 29	LDH C (-1)	
	16, 29	LD B (11)	
	11	LD B B	
	17	LD H A	print a character onto the screen
	28	LDJ BC	
	25	POP BC	
16620	10, 30	LD B (255)	
	10, 31	LDH C (-2)	delay loop
	21	POP BC	
	10, 36	LDH C (-10)	end of fill center routine
16627	29	RET	return to Basic



Hex dumper

Paul Murton creates a hex dump which enables you to inspect memory blocks.

This short program creates a hex dump on the Dragon 32.

On running, you are asked to enter the start and end addresses of the memory you wish to inspect. The hex is then displayed in blocks of 120.

When you have inspected each block, press the space bar and the next block of 120 will appear.

Those lucky enough to own a printer, need only replace lines 200 and 210 and insert a subroutine to copy the contents of the screen to the printer.



Beaufort scale

Robert Coates presents a spacecraft landing program complete with wind.

The aim of the game is to land your spacecraft on the landing pad on earth, just to the right of the flag.

The spacecraft starts at a random position at the top of the screen and automatically descends. There is also a strong wind blowing from the right which pushes your craft to the left.

To counteract the wind, press the spacebar. This moves your craft to the right and enables you to land.

If the landing is successful, then the game starts again with your craft in a different position. If unsuccessful, then the game ends.

To increase the difficulty, change line 180 to read:

180 $x = x - 0.6$ (or any other increment)

READY.

```

10 CLS:PRINT"          HEX DUMP"
20 PRINT"ENTER START ADDRESS (DEC)":INPUT A
30 PRINT"ENTRER END ADDRESS (DEC)":INPUT B
40 CLS:FOR N=A TO B STEP 8:Y=Y+1
50 PRINTHEX$(N);":"
60 FOR J=0TO 7
70 PRINTHEX$(PEEK(N+J));":"
80 NEXTJ
90 PRINT
100 IF Y/15=INT(Y/15)THEN GOSUB 200
120 NEXTN
130 GOTO130
200 A$INKEY$:IF A$="" THEN 200
210 CLS:RETURN
READY.

```

```

10 L=0
20 DIM R(14,14)
30 PMODE 3,1:SCREEN 1,0 : PCLS : COLOR 2,3
40 X=RND(150)+25:Y=RND(10)
50 RS="BM 105,27;H2E2R543H2L1G2D3R5F2G2"
60 TS="BM0,164;F4E3F7R2E4F5R6E6R15F6
      R16E7F4E6F3E2F5R3E3F4R4E6F4R4E10F4
      E3F8R1Q1E19P10E7F10R15E20U15E7"
70 PAINT(0,0),4
80 DRAW R$:DRAW T$
90 DRAW "BM39, 165; U6L4D3R4"
100 GET(101,13)-(115,27),R,G
110 X=X+1
120 IF INKEY$="" THEN 160
130 Y=Y+0.5
140 IF Y=153 THEN 210
150 GOTO 180
160 PUT(X,Y)-(X+14,Y+14),R,PSET
170 GOTO 110
180 X=X-0.4
190 PUT(X,Y)-(X+14,Y+14),R,PSET
200 GOTO 120
210 IF X>40 AND X<48 THEN 220 ELSE 290
220 PMODE 1,1:SCREEN 0,0 : PCLS
230 L=L+1
240 CLS(6)
250 PRINT @ 192, "CONGRATULATIONS"
260 PRINT @ 224, "SUCCESSFUL LANDINGS":L
270 FOR N=1 to 800 : NEXT N
280 GOTO 30
290 PMODE 1,1:SCREEN 0,0: PCLS
300 CLS(6)
310 PLAY "T20" + "ABCDCCBAGFAEDDAFB"
320 PRINT @ 192, "GAME OVER"
330 FOR N=1 to 1000 : NEXT N

```

PEEK & POKE

Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem *Peek it to Ian Beardmore and every week he will Poke back as many answers as he can. The address is Peek & Poke, PCW, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.*

BIAS ACCUSATION UNWARRANTED

R McConaghie of Middleborough, Cleveland, has sent a long letter accusing me (and most of the rest of the British computer press) of bias against the Atari computers. He refers mainly to my comments in Popular Computing Weekly, October 7. The main points of his letter are as follows:

Q The Ataris do not have a Verify command as such, but the same effect can be achieved by first Listing the program to tape and then Entering it back into the computer's memory. Not as convenient as a straightforward Verify, but it does serve the purpose. The Atari does not have a flashing ability, but it does have luminences which are a more than adequate replacement.

A user defined graphics function? I don't know what it does on a Spectrum, but player missile graphics must count as the same thing. The Atari can in fact also display 192 colours.

I feel that putridic fervour (what about the Vic?), seems to be leading to a very blinkered attitude on the part of the British press. I spent over 12 months researching the computer market before I bought an Atari. There are a few things that it cannot do that others can — how I would like a Get command for example. But this definitely works the other way round as well.

A Before I address myself to the important question of bias, I would like to clear up one point. The correct number of luminence levels is 16, not eight or 15.

I do not think that the fundamental quality of the Atari machines is really in doubt — their sound and graphics capabilities are excellent. Where I feel that disenchantment does creep in is the way the Atari user is tied to a small group of

dealers. This is especially noticeable when the Atari market is compared to the wide-open Sinclair market. It is easy to say that the customer has a lot of support and that the Atari is a modular system, but the customer will pay a great deal more for those modules than he would with another computer.

Perhaps it is partly jealousy that so many goodies seem to be locked up in the Atari in such a way that many users find them hard to get without paying a lot of money. Yet many similar goodies are available for other micros at much lower cost.

The Atari 400 does cost £200, but I have come across more than one person who has saved his money by buying an Atari computer, only to find that it is useless because he has no money left to buy any games and cannot program it because he has not got another £35 or £40 to buy the Rom.

SIGNIFICANT IMPROVEMENTS

Linda Crowther of Jubilee Drive, Thornaby, Avon, writes:

I am hoping to buy a Spectrum early next year (when the bugs have been sorted out) but in the meantime I am hoping to get a cassette player for Christmas. Do you know of one that will work well with the Spectrum, and that will also play music tapes? I know you covered this in September, but I would like some more details.

A This is also for James March of Sheffield and P Douglas of Faijkirk. It seems as though some of Uncle Clive's chickens are coming home to roost. For all those worried about LoadSave on the Spectrum, this is one area where very significant improvements have been made. Any domestic cassette player

with jack sockets for the ear and mic should work.

If you want a particular model, then Data-assette sell a Ferguson model which we use here in the office for both the ZX81 and the Spectrum. It can also play conventional cassettes, and has so far worked well in both the LoadSave and conventional audio roles. Data-assette is at 44 Shrotton Street, London NW1 6UG.

ACE AND THE FORTH CHALLENGE

Paul Purvis of Preston, Lancashire, writes:

I have seen the advertisements for the Jupiter Ace and, like a lot of other ZX81 owners, I am very interested in the challenge that Forth would offer. However, I am worried that the small faults which dogged the ZX81 will also plague the Ace. Namely, loose jack sockets and I/O connectors, poor Loading and Saving, and just the general decrepitude of the ZX81. I accept that a computer is not a robust toy, but it must be able to withstand a certain amount of wear and tear. Also I know the keyboard is meant to be a proper one, but does this mean 'proper' in the sense of the Spectrum keyboard?

A To a certain extent only time can fully answer your questions. However, the Ace is more robust than the ZX81. The jack sockets if anything are too tight. It is quite possible to lift the Ace up and shake it in the air without any chance of the plugs becoming disconnected even for a moment. As yet there are no add-ons for the I/O port, so I cannot say how good the connections will be.

Again, until it is thoroughly tested the LoadSave facilities cannot be judged. But it does seem as though the signal has been inverted, because the instructions that come with the computer tell you to turn the tone right down. Remember, the designers of the Ace were also responsible for the Spectrum, and the LoadSave in this is excellent.

The keyboard on the Ace is the same type as the Spectrum's, but the rubber is stiffer, and the keys have a small peg underneath to make con-

tact easier. For people used to the ZX81, and even the Spectrum, the positive response of the keys on the Ace will be very welcome.

It is a less delicate machine than the ZX81. However, such terms are relative and, like all computers, it is not designed to be battered or thrown around.

NON-APPEARING CURSOR

A Campbell of Arabella Drive, Rochampton, writes:

For the last few weeks, every time I try and turn on my ZX81 I get a plain screen, with no Cursor. I have tried the computer with and without the 16K Ram Pack, but I get the same response. I have an IVM attached but the computer started to go wrong before this was done. Please could you advise me on what to do?

A By IVM I presume you mean an inverse video module. You do not make it clear whether or not the problem has been worse since this has been fitted. I have met this problem from time to time, and have rectified it by simply pulling out the jack plug for a little while.

However, it is possible that you have had two faults run into each other. I do not know which inverse graphics module you have, but if it is Haven's, try making a small adjustment to the potentiometer, which does have a screw slot. I would suggest that you do this with a small piece of wood, to be on the safe side.

There is also a chance that the power supply is not stable enough. A 0.1 microfarad polystyrene resistor across the power supply should sort out this problem.

If none of this works, then you may have shorted out the video lead. The type of screen response you are getting means the computer is working, but the video signal is not getting through. You will have to try removing the IVM to see if you can get the cursor back without it. If you get no response then you will have to consider a new computer, because the fitting of the module will almost certainly have voided your guarantee.

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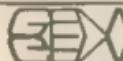
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A fallacy of the division of labour

If it takes three days for 12 politicians to dig four holes in the ground, how long does it take for 15 politicians to dig half a hole?

The answer: it is not possible to dig half a hole, for a hole is a hole be it ever so shallow. We might have asked how many holes the coalition could dig in a day, and the answer would not have been 5/3 holes.

Sometimes the article with which we are working is not amenable to simple quantitative notions. "Hole" is not an easily quantified object, though holes of specified dimensions can easily be specified. ... There are 20,000 holes in Blackburn, Lancashire. How many holes would it take to fill the Albert Hall? ...

Frederick P. Brooks, Jr., writes in (*The Mythical Man-month*, 1972) that to add more people to the production of a piece of software does not usually shorten the time taken to complete it. In fact, adding people extends the time needed to complete it. Software production is a human exercise in complex relationships, for every person needs to know something of what the others are doing. Even if the project has been partitioned into small segments to save time, adding more people means that communication time has to increase, and "adding more men then lengthens not shortens, the schedule."

The "mythical man-month" of Brooks' title is the assumption that, if it takes 12 man-months

to produce an item of software, it is possible to employ either 12 people for 1 month or 1 person for 12 months; whereas it might take 12 people 6 months.

Brooks makes the point that though the division of labour works in conventional manufacturing — making metal pins for example — this is not true of products of the mind. He says: "Men and months are interchangeable commodities only when a task can be partitioned among many workers with no communication among them."

When making pins or electronic gadgets, there is very little need for communication — but this cannot be said of software production or the design of new gadgets. The Apple II computer was designed by two men (one hardware, one software); the Sinclair series has been designed by small teams; the Osborne 1 is the result of one man's vision, and the story is being repeated all the time in the UK and USA.

Japan is the world leader in manufacturing gadgets, a fact with which governments are only too well acquainted. The Japanese strength is in producing and improving goods, which others have designed and invented, more cheaply than they themselves are able. The Japanese reputation for innovation is mostly a reputation for improvement. Their position as leader in the production of cheaper gadgets is now under attack from many other countries (including Hong Kong, Singapore and Taiwan) who can produce pins more cheaply.

The nature of Japanese society is bureaucratic, paternalistic, and deferential, and the individual tends to be lost. As there has been so little good software produced by the Japanese, perhaps we might postulate that this is the reason? To create pins (or gadgets) requires efficiency, and the man-month argument fits. To create intellectual products requires a more complex approach to people. Programmers are not assembly-line workers. The Japanese government has realised that others will undercut them in production, so they have set up the Fifth Generation Project. To speed up the production of software they are employing thousands of people ...

Boris Alten

Puzzle

Expressing squares in twos

Puzzle No 33

Fifty is the smallest number that can be expressed as the sum of two squares in two different ways: seven squared plus one squared or twenty-five squared plus twenty-five squared.

What are the next three higher numbers that can be formed, in the same way, as the sum of two squares in two ways?

Solution to Puzzle No 28

We must find a number, N, which, when divided into each of the four numbers given (1702, 3064, 5334 and 6698), produces the same remainder. In the program below the value N is repeatedly subtracted from the first of the numbers until the remainder, R, is found. This value is then subtracted from each of the other three numbers and each is tested to see if it is a multiple of N. Since the highest value is required, N is started at 1702 and is decremented by one each time the loop is run.

```
19 FOR N = 1702 TO 1 STEP -1
20 LET R = 1702 - N
21 IF R < 0 THEN LET R = R + N
22 LET A = 3064 - R
23 LET B = 5334 - R
24 LET C = 6698 - R
25 IF A/N <= INT (A/N)<>0 THEN GOTO 129
26 IF B/N <= INT (B/N)<>0 THEN GOTO 129
27 IF C/N <= INT (C/N)<>0 THEN GOTO 129
100 PRINT N
110 STOP
129 NEXT N
```

This gives us the answer of 454 leaving, in each case, a remainder of 340.

Winner of Puzzle No 28

The winner is J P Mensink, Acorn Crescent, Newcastle-upon-Tyne, who receives £10.

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6	Master Maze	(Campbell Systems)	6	Space Invaders	(Ducksoft)
7	Subspace Striker	(Phase)	7	Star Battle	(Commodore)
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9	Chess I	(Artic)	9	Traxx	(Iremsoft)
10	Denbase	(Campbell Systems)	10	Scramble	(Rabbit)

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8	Grid Runner	(Iremsoft)
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10	Scramble	(Rabbit)

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Books

1	Starting Point, Brindle	(Prentice Hall)
2	ZX Spectrum Explored, Hamrel	(Sinclair Browne)
3	BBC Micro Revealed, Ruston	(Interface)
4	ZX81 Users Handbook, Tandy and Simpkins	(Hewitt)
5	ZX81 Programming for the ZX Spectrum, Stewart and Jones	(Osborne)
6	Z80 Assembly Language Programming, Leverett	(Melbourne House)
7	Over the Spectrum, various authors	(Sybex)
8	Programming the 6502, Zelnik	(Sybex)
9	Machine Code and Basic Reference, Stewart and Jones	(Sybex)
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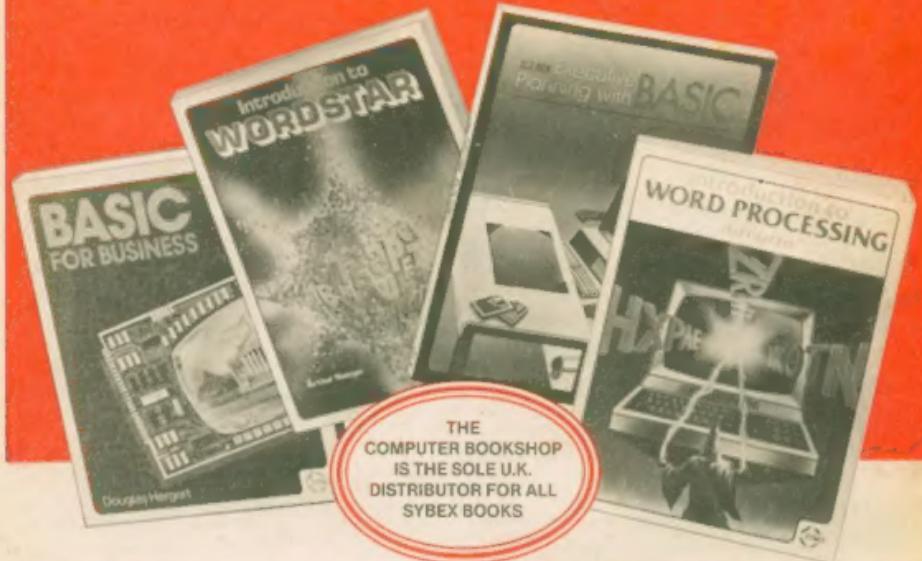
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